

What Is Claimed Is:

1. An apparatus for use in evaluating a patient's response with an implanted element of a hearing aid, said implanted hearing aid element being adapted for directly stimulating a middle ear element of said patient in response to a communication signal transmitted transcutaneously to said implanted hearing aid element, said apparatus comprising:

an input port for receiving an input signal reflecting a reference acoustical output of an audiometer;

a converter system for converting said input signal into an output signal representing a test communication signal; and

an output port for outputting an output signal representative of said test communication signal;

wherein, upon transcutaneous transmission of said test communication signal to said implanted hearing aid element, a performance relative to said patient's response can be analyzed.

2. An apparatus as set forth in Claim 1, wherein said input port is interconnected to a headphone output module of said audiometer and said input signal is representative of a test acoustical pattern.

3. An apparatus as set forth in Claim 1 where said converter comprises a reference transmitter for driving an RF transmitter to provide said test communication signal based on said input signal reflecting said reference acoustical output of said audiometer.

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4. An apparatus as set forth in Claim 1, wherein said output port is interconnected to a radio transducer element for generating said output signal as an RF signal.

5. A method for use in testing an implanted element of a hearing aid, said implanted hearing aid element being adapted for directly stimulating a middle ear element of a patient in response to a communication signal transmitted transcutaneously to said implanted hearing aid element, said method comprising the steps of:

receiving an input signal reflecting a test acoustical output of an audiometer;

converting said input signal into a test communication signal;

transmitting the test communication signal via a transmitter adapted for placement over the implanted hearing aid element on a head of a patient;

wherein a performance of the implanted hearing aid element can be evaluated based on said transmitted test communication signal free from acoustical stimulation of the tympanic membrane for testing purposes.

6. A method as set forth in Claim 5, wherein said step of converting comprises generating an output signal based on said test acoustical output, for driving said transmitter and driving said transmitter to provide said test communication signal as an RF signal.

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7. A method as set forth in Claim 5, wherein said step of transmitting comprises positioning said transmitter on the head of said patient proximate to said implanted element and operating said transmitter to transmit said communication signal to said implanted element.

10 8. A method as set forth in Claim 5, further comprising the steps of receiving feedback from said patient regarding a perception of said communication signal and using said feedback to determine a desired performance-related parameter for said hearing aid.

15 9. A method as set forth in Claim 8, wherein said step of using said feedback comprises determining internal values for operation of said hearing aid.

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10. A method for use in testing an implanted element of a hearing aid, said implanted hearing aid element being adapted for directly stimulating a middle ear element of a patient in response to a communication signal transmitted transcutaneously to said implanted hearing aid element, said method comprising the steps of:

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providing an audiometer, a reference transmitter and a reference signal output, where the audiometer, reference transmitter and reference signal output are operatively interconnected so that the audiometer provides an input signal to the reference transmitter reflecting a test acoustical signal of the audiometer, the reference transmitter converts the input signal into a test communication signal reflective of the reference acoustical signal, and the reference signal output transmits the test communication signal;

placing the reference signal output over the implanted hearing aid element on the head of said patient;

operating the audiometer, reference transmitter and reference signal output to transcutaneously transmit the reference electromagnetic signal reflective of the test acoustical signal to the implanted hearing aid element;

obtaining feedback from said patient regarding a perception of said transmitted test communication signal; and

adjusting a performance of said hearing aid based on said feedback from said patient.

11. A method as set forth in Claim 10, wherein said reference signal output comprises an RF transmitter and said step of operating comprises transmitting an RF signal.

5 12. A method as set forth in Claim 10, wherein said step of adjusting a performance comprises determining internal values for operation of said hearing aid.

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13. An apparatus for use in connection with a reference transmitter for testing an implanted element of a hearing aid, said implanted hearing aid element being adapted for directly stimulating a middle ear element of a patient in response to a communication signal transmitted transcutaneously to said implanted hearing aid element, said reference transmitter being operative for receiving an input signal reflecting a test acoustical output of an audiometer, converting said input signal into a test communication signal and transmitting the test communication signal, said apparatus comprising:

an interface for connecting to the reference transmitter to receive the reference transmitter output signal;

a transducer for receiving the reference transmitter output signal and outputting a test signal based on the received reference transmitter output signal, said transducer being adapted for placement over the implanted hearing aid element on a head of a patient; and

a lead for interconnecting the interface and a transducer so as to transmit the reference transmitter output signal from the interface to the transducer.

14. An apparatus as set forth in Claim 13, wherein said interface comprises a connector for use in establishing a connection with an output port of said reference transmitter.

15. An apparatus as set forth in Claim 13, wherein said transducer comprises an RF transmitter element.

16, An apparatus for use in testing an external portion of a semi-implantable hearing aid, said external portion being adapted for transcutaneously transmitting communication signals to an implanted portion of said hearing aid, said apparatus comprising:

5 a reference receiver system for receiving an input communication signal from said exterior portion of said hearing aid, wherein said input communication signal is based on a test acoustical signal provided by a hearing aid analyzer;

10 a signal processor for processing a receiver signal based on said input communication signal to generate an output signal of characteristics corresponding to a microphone signal of an acoustical hearing aid testing system; and

an output port for outputting said output signal to said hearing aid;

15 wherein said analyzer uses said output signal to evaluate a performance of said exterior portion of said hearing aid.

20 17. An apparatus as set forth in Claim 16, wherein said reference receiver system includes an input port and a reference receiver unit, said port being adapted to support said external portion of said hearing aid at a determined distance from said reference receiver unit and said reference receiver being adapted to receive said input communication signal and provide said receiver signal in response thereto.

18. An apparatus as set forth in Claim 16, wherein said receiver signal comprises an electrical signal analogous to the mechanical output of an electromechanical transducer hearing aid element and said signal processor correlates said electrical signal to said output signal.

5 19. A method for use in testing an exterior portion of a semi-implantable hearing aid, said external portion being adapted for transcutaneously transmitting communication signals to an implanted portion of said hearing aid, said method comprising the steps of:

10 exposing said exterior portion of said hearing aid to a test acoustical signal generated by a reference acoustic transducer;

15 interconnecting said exterior hearing aid portion to a reference receiver, said reference receiver being operative to receive an input communication signal from said exterior portion of said hearing aid, process said input communication signal to generate an output signal that corresponds to a microphone signal of an acoustical hearing aid testing system and transmit said output signal to an analyzer that uses the output signal to evaluate a performance of said exterior portion of said hearing aid; and

20 operating said reference receiver and said analyzer to evaluate a performance of said exterior portion of said hearing aid.

22. A method for use in calibrating a hearing aid testing system, said testing system including a reference transmitter and a reference receiver, where the reference transmitter and reference receiver can be used to test the internal and external components, respectively, of a semi-implantable hearing aid, said method comprising the steps of:

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interconnecting said reference transmitter to said reference receiver so that the reference receiver receives a transmitter output signal from said reference transmitter;

interconnecting said reference transmitter to an audiometer for receiving an audiometer test signal;

interconnecting said reference receiver to a hearing aid analyzer;

operating said audiometer to generate said audiometer test signal;

operating said reference transmitter to receive said audiometer test signal and generate said transmitter output signal based thereon;

generating said reference receiver to provide a receiver output signal reflective of said transmitter output signal and correlated to a microphone input signal; and

operating said hearing aid analyzer to provide an indication of hearing aid performance, wherein said indication can be used to calibrate said testing system.